

13

The resulting samples had the following properties:

Property	Comparison	Invention
Thickness (mm)	12.46	12.47
Density (g/cm ³)	0.617	0.627
Plastic yield (MPa)	0.98	1.16
Young's Modulus (MPa)	1 374	1 711

What is claimed is:

1. A continuous process for manufacturing set cellular cement, comprising the steps of:

(i) mixing a cementitious material, water, a foaming agent, a retarder, an accelerator and optionally additives in a primary mixer under high-shear mixing conditions, an amount of the foaming agent being 0.01 to 1 g/l of slurry, an average residence time being 1 to 10 seconds, and the peripheral speed being at least 400 m/min, into a free flowing slurry having a slump of at least 100 mm, wherein the primary mixer is an inclined disc mixer; subsequently

(ii) injecting air by a nozzle in a secondary mixer under controlled-shear mixing conditions, the peripheral speed being lower than the high-shear mixing conditions of step (i), into the slurry of step (i) and distributing air through the slurry to form a cellular slurry, wherein the secondary mixer comprises a tee for receiving the slurry through a first pipe and air through a second pipe; subsequently

(iii) casting said cellular slurry of step (ii); and

(iv) finally allowing said cellular slurry to set,

in which the cementitious material is calcium sulfate α -hemi-hydrate, calcium sulfate β -hemi-hydrate or a blend thereof, and the final set product has a core density between 200 and 1100 kg/m³,

wherein a water/plaster ratio of the slurry is 0.65 to 1.05 by weight, the plaster being the cementitious material.

2. The process of claim 1, in which step (i) is performed in the absence of fiber.

3. The process of claim 1, in which step (i) is performed in the presence of fibers.

4. The process of claim 1, in which step (ii) is performed under low-shear mixing conditions.

5. The process of claim 1, in which step (i) is carried out in the absence of added prefabricated foam.

6. The process of claim 1, in which step (i) is carried out in the presence of added prefabricated foam.

7. The process of claim 1, in which the slump of the slurry obtained at step (i), is at least 150 mm.

8. The process of claim 1, in which the slump of the slurry obtained at step (i), is from 200 to 250 mm.

9. The process of claim 1, in which, in the final set product, the pores volume created by water voids ranges from 20 to 65% vol and the cell volume created by injected air ranges from 3 to 50% vol.

10. The process of claim 1, in which, in the final set product, the total pore volume ranges is between 47 and 95% vol.

11. The process of claim 1, in which, in the final set product, the total pore volume ranges from 53 to 75% vol.

12. The process of claim 1, in which the cement further comprises at least one aggregate or at least one filler or both.

14

13. The process of claim 1, in which step (i) further comprises the step of retarding the setting of cement while step (ii) further comprises the step of accelerating the setting of cement.

14. The process of claim 1, which further comprises retarding the setting of the plaster and accelerating the setting of the plaster.

15. The process of claim 1, wherein the retarder comprises sodium polyacrylate and the accelerator comprises aluminum sulfate.

16. The process of claim 1, wherein the retarder comprises sodium phosphonate and the accelerator comprises zinc sulfate.

17. The process of claim 1, in which step (i) or step (ii) or both further comprises the step of adding a strength enhancing resin into the slurry.

18. The process of claim 17, in which the strength enhancing resin is a styrene-butadiene copolymer.

19. The process of claim 1, in which step (i) or step (ii) or both further comprises the step of adding a bubble stabilizing agent into the slurry.

20. The process of claim 1, in which step (i) or step (ii) or both further comprises the step of adding a water-soluble viscosity modifier into the slurry.

21. The process of claim 1, in which step (i) comprises two sub-steps (a) and (b), where sub-step (a) comprises the step of mixing the cementitious material, water, the retarder and optionally additives and sub-step (b) comprises the step of adding the foaming agent and the accelerator to the slurry of sub-step (a).

22. The process of claim 21, in which sub-step (a) is performed under high-shear mixing conditions.

23. The process of claim 1, which comprises, between step (i) and step (ii), a step of spreading the slurry of step (i) prior to the introduction of air.

24. The process of claim 1, in which step (iii) comprises the step of depositing said slurry on at least one moving facer to form a cellular core.

25. The process of claim 1, in which step (iii) comprises the step of depositing said slurry on at least one moving facer to form a cellular core and which further comprises diverting part of the slurry obtained in step (i) as a stream which is deposited to the cellular core.

26. The process of claim 1, in which step (iii) comprises the step of depositing said slurry on at least one moving facer to form a cellular core and which further comprises diverting part of the slurry obtained in step (i) as a stream which is deposited onto or beneath the cellular core or both.

27. The process of claim 24, in which the moving facer is paper.

28. The process of claim 24, further comprising the step of removing the facer after the cement has set.

29. The process of claim 24, in which the moving facer is a non-woven mat.

30. The process of claim 24, in which the moving facer is a non-woven glass mat.

31. The process of claim 1, in which step (ii) comprises the sub step of expanding air between injecting and distributing.

32. The process of claim 1, wherein, in the final set product, the total pore volume is about 83% vol.

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